

What is claimed is:

1. A spreader roll for processing machines of the type used in the paper, textile and plastics industry comprising:
 - a bowable shaft;
 - 5 a cylindrical outer surface comprising a plurality of cylinder elements axially aligned along said shaft, each of said elements having an outer surface and at least one end portion having a nonlinear profile.
2. The spreader roll of claim 1 wherein said nonlinear profile of adjacent ones of said cylinder elements are arranged in mating relationship.
3. The spreader roll of claim 2 wherein said nonlinear profile defines a generally sine wave configuration.
4. The spreader roll of claim 3 wherein said sine wave configuration includes flattened areas.
5. The spreader roll of claim 3, wherein said sine wave configuration includes tessellated, partially mosaic flattened areas.
6. In a spreader roll including a bowable shaft, a cylindrical outer surface mounted for rotation about said shaft, said cylindrical outer surface being comprised of a plurality of interconnected cylinder elements, each of said cylinder elements including an outer surface and oppositely disposed end portions, the improvement wherein at least one of said oppositely disposed end portions has a nonlinear profile.
7. The spreader roll of claim 6 wherein said nonlinear profile defines a sine wave configuration.
8. The spreader roll of claim 7 wherein said sine wave configuration includes flattened areas.
9. The spreader roll of claim 8 wherein said sine wave configuration includes tessellated, partially mosaic flattened areas.

10. A spreader roll for processing machines of the
 5 type used in the paper, textile and plastics industry
 comprising:

a bowable shaft;

a plurality of roll segments, said roll segments
 being rotatably supported on said shaft; and

10 each said segment having at least one non-linear
 end edge profile.

11. The spreader roll of claim 10 wherein said non-
 linear end edge profiles are arranged to intermesh with
 adjacent roll segments.

12. The spreader roll of claim 10 wherein said non-
 linear end edge profile is substantially sinusoidal.

13. The spreader roll of claim 12 wherein the
 substantially sinusoidal edge profile includes at least
 one flattened area.

14. The spreader roll of claim 12 wherein the
 substantially sinusoidal edge profile includes
 tessellated, partially mosaic flattened areas.

15. A spreader roll for processing machines of the
 type used in the paper, textile and plastics industry
 comprising:

a bowable shaft;

5 a cylindrical outer surface comprising a
 plurality of cylindrical roll segments axially aligned
 and rotatably supported on said shaft; and
 each said segment having a sinusoidal end edge profile.

16. The spreader roll of claim 15 wherein said non-
 linear end edge profiles are arranged to interlock with
 adjacent roll segments.

17. The spreader roll of claim 15 wherein each said
 sinusoidal end edge profile includes at least one
 flattened area.

5 18. The spreader roll of claim 15 wherein each said
 sinusoidal end edge profile includes tessellated,

partially mosaic flattened areas.

| Parameter | Unit | Value |
|-------------------------------|--------------------------------|----------------|
| Temperature | °C | 25 |
| Time | h | 24 |
| Concentration | mg/L | 100 |
| pH | | 7.0 |
| Light intensity | μmol photons/m ² /s | 100 |
| CO ₂ concentration | ppm | 400 |
| Relative humidity | % | 60 |
| Gas flow rate | L/min | 1.0 |
| Agitation speed | rpm | 100 |
| Medium composition | | See Table 1 |
| Cell density | 10 ⁶ cells/mL | 1.0 |
| Optical density | | 0.1 |
| Protein concentration | mg/mL | 1.0 |
| Enzyme activity | U/mg | 1.0 |
| Substrate concentration | mg/mL | 1.0 |
| Product concentration | mg/mL | 1.0 |
| Reaction time | min | 30 |
| Reaction temperature | °C | 37 |
| Reaction pH | | 7.0 |
| Reaction volume | mL | 1.0 |
| Reaction pressure | atm | 1.0 |
| Reaction atmosphere | | N ₂ |
| Reaction medium | | See Table 2 |
| Reaction time | h | 24 |
| Reaction temperature | °C | 37 |
| Reaction pH | | 7.0 |
| Reaction volume | mL | 1.0 |
| Reaction pressure | atm | 1.0 |
| Reaction atmosphere | | N ₂ |
| Reaction medium | | See Table 3 |
| Reaction time | h | 24 |
| Reaction temperature | °C | 37 |
| Reaction pH | | 7.0 |
| Reaction volume | mL | 1.0 |
| Reaction pressure | atm | 1.0 |
| Reaction atmosphere | | N ₂ |
| Reaction medium | | See Table 4 |
| Reaction time | h | 24 |
| Reaction temperature | °C | 37 |
| Reaction pH | | 7.0 |
| Reaction volume | mL | 1.0 |
| Reaction pressure | atm | 1.0 |
| Reaction atmosphere | | N ₂ |
| Reaction medium | | See Table 5 |
| Reaction time | h | 24 |
| Reaction temperature | °C | 37 |
| Reaction pH | | 7.0 |
| Reaction volume | mL | 1.0 |
| Reaction pressure | atm | 1.0 |
| Reaction atmosphere | | N ₂ |
| Reaction medium | | See Table 6 |
| Reaction time | h | 24 |
| Reaction temperature | °C | 37 |
| Reaction pH | | 7.0 |
| Reaction volume | mL | 1.0 |
| Reaction pressure | atm | 1.0 |
| Reaction atmosphere | | N ₂ |
| Reaction medium | | See Table 7 |
| Reaction time | h | 24 |
| Reaction temperature | °C | 37 |
| Reaction pH | | 7.0 |
| Reaction volume | mL | 1.0 |
| Reaction pressure | atm | 1.0 |
| Reaction atmosphere | | N ₂ |
| Reaction medium | | See Table 8 |
| Reaction time | h | 24 |
| Reaction temperature | °C | 37 |
| Reaction pH | | 7.0 |
| Reaction volume | mL | 1.0 |
| Reaction pressure | atm | 1.0 |
| Reaction atmosphere | | N ₂ |
| Reaction medium | | See Table 9 |
| Reaction time | h | 24 |
| Reaction temperature | °C | 37 |
| Reaction pH | | 7.0 |
| Reaction volume | mL | 1.0 |
| Reaction pressure | atm | 1.0 |
| Reaction atmosphere | | N ₂ |
| Reaction medium | | See Table 10 |
| Reaction time | h | 24 |
| Reaction temperature | °C | 37 |
| Reaction pH | | 7.0 |
| Reaction volume | mL | 1.0 |
| Reaction pressure | atm | 1.0 |
| Reaction atmosphere | | N ₂ |
| Reaction medium | | See Table 11 |
| Reaction time | h | 24 |
| Reaction temperature | °C | 37 |
| Reaction pH | | 7.0 |
| Reaction volume | mL | 1.0 |
| Reaction pressure | atm | 1.0 |
| Reaction atmosphere | | N ₂ |
| Reaction medium | | See Table 12 |
| Reaction time | h | 24 |
| Reaction temperature | °C | 37 |
| Reaction pH | | 7.0 |
| Reaction volume | mL | 1.0 |
| Reaction pressure | atm | 1.0 |
| Reaction atmosphere | | N ₂ |
| Reaction medium | | See Table 13 |
| Reaction time | h | 24 |
| Reaction temperature | °C | 37 |
| Reaction pH | | 7.0 |
| Reaction volume | mL | 1.0 |
| Reaction pressure | atm | 1.0 |
| Reaction atmosphere | | N ₂ |
| Reaction medium | | See Table 14 |
| Reaction time | h | 24 |
| Reaction temperature | °C | 37 |
| Reaction pH | | 7.0 |
| Reaction volume | mL | 1.0 |
| Reaction pressure | atm | 1.0 |
| Reaction atmosphere | | N ₂ |
| Reaction medium | | See Table 15 |
| Reaction time | h | 24 |
| Reaction temperature | °C | 37 |
| Reaction pH | | 7.0 |
| Reaction volume | mL | 1.0 |
| Reaction pressure | atm | 1.0 |
| Reaction atmosphere | | N ₂ |
| Reaction medium | | See Table 16 |
| Reaction time | h | 24 |
| Reaction temperature | °C | 37 |
| Reaction pH | | 7.0 |
| Reaction volume | mL | 1.0 |
| Reaction pressure | atm | 1.0 |
| Reaction atmosphere | | N ₂ |
| Reaction medium | | See Table 17 |
| Reaction time | h | 24 |
| Reaction temperature | °C | 37 |
| Reaction pH | | |